

REMARKS

Claims 1- 40 are all the claims presently pending in the application. Claims 1, 6, 7, 12, 14, 19-20, 25, 27 and 34 have been amended to more clearly define the invention. Claims 39 and 40 have been added to claim additional features of the claimed invention.

The claim amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability. Applicants also note that, notwithstanding any claim amendments herein or later during prosecution, Applicants' intent is to encompass equivalents of all claim elements.

Claims 1-38 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Stephens et al. (U. S. Pat. No. 6,563,614).

This rejection is respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

An exemplary embodiment of the claimed invention, as defined by, for example, independent claim 1, is directed to an optical communication system for amplifying an optical signal propagating through an optical transmission line by using an optical amplifier in an optical repeater and emitting an amplified optical signal to an optical transmission line mounted at a back stage. The system includes a transmission line compensating device to generate control light which is input to the optical transmission line to produce a Raman amplification effect within the optical transmission line that is outside of the optical repeater based on a control signal superimposed on the optical signal.

Conventional optical communication systems have optical signal characteristics which are affected by leakage of pumping light emitted from an optical repeater and a loss spectrum that is exhibited intrinsically by the optical transmission line. As the number of wavelength-multiplexed signals increase, it becomes more difficult to properly calibrate a difference in output of each signal.

The claimed invention, on the other hand, includes a transmission line compensating

device to generate control light which is input to the optical transmission line to produce a Raman amplification effect within the optical transmission line (Application at page 9, lines 19-28; Figure 2). For example, the Raman amplification effect may be produced by propagating the control light through the optical transmission line (Application at page 9, line 29-page 10, line 6). Thus, an output of an optical signal and a loss spectrum exhibited by the optical transmission can be properly controlled, thus enabling the optical transmission line of high quality to be implemented (Application at page 11, lines 13-18).

II. THE STEPHENS REFERENCE

The Examiner alleges that the Stephens teaches the invention of claims 1-38. Applicant submits, however, that Stephens does not teach or suggest each and every element of the claimed invention.

Stephens discloses an optical transmission system which includes an optical signal controller 12 for controlling a characteristic of an optical signal passing between two nodes 14 (Stephens at col. 6, lines 15-19; Figures 1-3). The controller 12 includes an optical compensation source 30 which provides power in a compensating channel λ_{ci} which is combined with an optical signal channel λ_i (Stephens at col. 7, lines 4-7).

The controller 12 also includes an optical distributor 28 for providing a monitoring signal (Stephens at col. 7, lines 10-14; Figure 3) and a source controller 32 which receives the monitoring signal, converts the monitoring signal to an electrical signal, and controls the compensation source 30 based on that electrical signal (Stephens at col. 7, lines 28-31). The source controller 32 also controls a pump source 38 which supplies pump energy to Raman amplifiers 36, in response to the monitoring signal (Stephens at col. 8, lines 1-6).

However, Applicant respectfully submits that Stephens does not teach or suggest “*a transmission line compensating device to generate control light which is input to said optical transmission line to produce a Raman amplification effect within said optical transmission line ...*”, as recited, for example, in claim 1.

As noted above, unlike conventional optical communication systems which have optical

signal characteristics which are affected by a loss spectrum that is exhibited intrinsically by the optical transmission line, the claimed invention includes a transmission line compensating device to generate control light which is input to the optical transmission line to produce a Raman amplification effect within the optical transmission line (Application at page 9, lines 19-28; Figure 2). The Raman amplification effect may be produced, for example, by propagating the control light through the optical transmission line (Application at page 9, line 29-page 10, line 6). This feature allows the claimed invention to properly control an output of an optical signal and a loss spectrum exhibited by the optical transmission, thus enabling an optical transmission line of high quality to be implemented (Application at page 11, lines 13-18).

Clearly, this feature is not taught or suggested by Stephens. Indeed, the Examiner attempts to equate the optical signal controller 12 with the transmission line compensation device of the claimed invention. However, this is clearly incorrect.

Indeed, as noted above, the controller 12 includes an optical distributor 28 for providing a monitoring signal (Stephens at col. 7, lines 10-14; Figure 3) and a source controller 32 which receives the monitoring signal, converts the monitoring signal to an electrical signal, and controls the compensation source 30 based on that electrical signal (Stephens at col. 7, lines 28-31). The source controller 32 also controls a pump source 38 which supplies pump energy to Raman amplifiers 36, in response to the monitoring signal (Stephens at col. 8, lines 1-6).

Thus, for example, nowhere does Stephens teach or suggest that the controller 12 generates a control light which is input to the optical transmission line to produce a Raman amplification effect within the optical transmission line. In fact, the Examiner attempts to equate the monitoring signal in Stephens with the control light of the claimed invention. However, in Stephens, the monitoring signal is not input to the optical transmission line. Instead, the monitoring signal is input to the source controller 32 where it is converted to an electrical signal (e.g., by a photodiode 34 (see Figure 4)) and that electrical signal is used to control the compensation source 30.

The Examiner also attempts to equate an alleged Raman amplification effect generated by the Raman amplifiers 36 with the Raman amplification effect in the claimed invention.

However, this is clearly incorrect. Indeed, in the claimed invention, the Raman amplification effect is produced within the optical transmission line. That is, in the claimed invention, the Raman amplification effect may be produced by propagating the control light through the optical transmission line (Application at page 9, line 29-page 10, line 6). This is completely different from the Stephens device in which the controller 12 controls a pump source 38 which supplies pump energy to the Raman amplifiers 36.

Therefore, Applicant respectfully submits that Stephens does not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant respectfully submits that claims 1-40, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,



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